FACTORS AFFECTING THE INCIDENCE OF "VULNERABLE" AND "LOSS" LOANS IN PCA's

By W. F. Lee, G. A. Marsh and R. L. Meyer*

Introduction

Loan losses have represented an insignificant cost for most agricultural lenders in the U.S. since the 1930's. Nevertheless, there is a continuing interest in the question of loan quality and USDA surveys reveal a slight increase in the incidence of farm credit problems during the past two years, associated with a softening in the prices of some farm commodities. Lenders express increasing concern about the quality of their loan portfolios as the size of individual credit lines increases and total loan volume becomes increasingly concentrated among a relatively small number of borrowers with large loans. Ohio lenders have fared well with their farm loan portfolios but they have also experienced more variation in loan quality in recent years. Nonreal estate lenders have been particularly vulnerable to ups and downs in farm incomes. This paper reports on changes in the quality of PCA loans and on a preliminary analysis of factors affecting loan quality.

Previous Work

Most studies of loan quality focus on the characteristics of the individual borrower. That is, a sample of loans from the total portfolio is divided into "good" and "bad" categories and data from the lender's loan file are used to describe these two groups. An implicit objective of most of these studies has been to examine good and bad loans in an ex post sense in an effort to derive a valid predictive model for classifying new loan applicants. Such

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*Warren Lee and Richard Meyer are Associate Professor and Gene Marsh is a former graduate student, The Ohio State University and the Ohio Agricultural Research and Development Center. This paper was prepared for the annual meeting of Regional Research Committee W-149, San Francisco, Jan. 26, 1979.

models would undoubtedly help the lender anticipate how new loans will affect the total portfolio. Examples of this approach are found in work by Reinsel and Brake, Krause and Williams, Dunn and Frey, Evans, and others. While these studies have identified several characteristics associated with loan failure, they have been only partially successful in the search for a credit scoring system that provides acceptably low probabilities of both Type I and Type II errors. In fact, discriminant-type credit scoring systems have yet to replace the judgement of the individual loan officer in most farm and non-farm lending situations.

Although the loan officer is obviously concerned with the problem of predicting success or failure for an individual loan, lending institutions manage default risk through the law of large numbers. As Smith points out, three statements can be made about default risk on large portfolios: 1) the number of loans that will go bad can be predicted with considerable accuracy, 2) the possibilities of a total loss are remote, and 3) some losses are almost certain. To the extent these conditions hold, default risk can be incorporated into the cost of doing business by carrying loan loss reserves. Since some losses are inevitable, the lender must be concerned with the level of problem loans that is in some sense "acceptable" or "normal" and attempt to meet this target. Moreover, large year-to-year deviations from the "normal" amount of loan losses may create serious liquidity management problems for the lender.[1/] With these concerns in mind, we attempted to develop a model with macro-level variables expected to be associated with (and presumably that could be used to predict) the overall incidence of lower quality loans for the lending

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[1/] With their fairly elastic supply of funds, liquidity management is less of a problem for PCA's than for commercial banks and other lenders that are more dependent on local sources of funds.

institutions, in this case a local PCA.

PCA Lending in Ohio

Ohio ranks about eleventh in the nation in total cash receipts from farming and its agriculture ranges from Corn Belt in the west and northwest to Appalachia in the southeast. The total market value of farm assets as of January 1, 1977 was $25.2 billion and total debt was just under $3 billion of which $1.2 billion was classified as nonreal estate debt (Balance Sheet of the Farm Sector). Ohio's 11 Production Credit Associations account for over 60 percent of total nonreal estate debt from institutional sources.

PCA Credit Review Procedures

Each PCA receives an annual credit review by the district FICB. The objective of the credit review is, "...to accomplish a more concentrated and in-depth review of associations having more than normal credit problems, to inform the directors and officers in positions of responsibility and accountability, and to contribute to the improvement of the association's credit quality" (FICB of Louisville). The credit review includes an evaluation of loans, acquired property, sales contracts, liquidating assets, and other loan related assets or programs providing similar financial assistance. The review also includes an evaluation of the credit management and administration in the association.

An important part of the credit review conducted by the FICB is the examination and classification of existing loans. The sampling technique employed by the FICB in the evaluation of PCA loan portfolios is very similar to that used by the regulatory agencies in the commercial banking system. For PCA's, a cutoff level in terms of loan size is defined to insure that 75 percent of the loan volume will be reviewed. Ten percent of the loans by number below the cutoff point are also examined. The sampling technique for the selection

of these loans changes annually. In addition to the examination of loans above the cutoff point and the random examination of 10 percent of the loans below the cutoff point, the association manager is required to submit for review all loans not included in the scope of the review that might border on or involve losses. In other words, the manager must certify that all loans not reviewed are, in his opinion, fully collectible. (See Appendix II for details of the loan classification system and other examination criteria.)

The measure of PCA loan quality used in this study was provided by the Louisville FICB, based on this loan classification system. Factors hypothesized to be related to the proportion of "vulnerable" and "loss" loans in PCA's were examined through multiple linear regression analysis. The method of ordinary least squares was used in the estimation of regression parameters. The unit of observation was the individual PCA association area.

Since the classification of individual loans by FICB examiners is heavily influenced by borrower performance, independent variables representing factors thought to have an important influence on debt repayment capacity were included. Other independent variables provided a measure of the type of farming in the association area and the PCA market share of the nonreal estate agricultural credit market in the area. The objective was to develop an explanatory model for loan quality that requires readily available, general economic data.

The model for the analysis of loan quality can be summarized as follows:

$$ALQ = f\ (CR, ANFI, TOF, ED, MS, UNEM, A_i, T_i)$$

where, for each PCA area,

ALQ = average loan quality, defined as (the dollar volume of loans classified as "vulnerable" and "loss") ÷ (total loans outstanding).

CR = cash receipts per farm (deflated by the index of prices paid by farmers, 1967 = 100).

ANFI = availability of nonfarm income, measured by the average annual salary of workers covered under the Ohio Unemployment Compensation Act (deflated).

TOF = type of farm measured by the ratio of cash receipts from the sale of livestock and livestock products to total farm cash receipts.

ED = existing debt, the amount of commercial bank and PCA loans outstanding per farm (deflated).

MS = PCA market share or the proportion of PCA and commercial bank non-real estate debt held by the PCA's.

UNEM = the unemployment rate.

A_i and T_i = association and year dummy variables.

Since the data were pooled, an observation was available for every association providing 11 observations for each year in the analysis. The values for all independent variables were lagged one year from the value of the dependent variables to reflect the fact that the incidence of problem loans this year is probably a function largely of economic conditions last year. An alternative form of the model tested the relationship between absolute measures of the variables, without lagging the independent variables. Data for variables ALQ, CR, ANFI and TOF were available for the period 1969-77. For variables ED, MS and UNEM, the analysis was limited to 1974-77.

Some general conclusions can be drawn from the descriptive data in Tables A-1 through A-3. Perhaps the most important is that the mean ratio of vulnerable and loss, to total loan volume is quite low -- only 1 to 2 percent for most associations. While the value of the dependent variable ALQ exhibits some stability in a few associations over time, there is a great deal of year-to-year variation in this measure of loan quality in most associations. Although each manager's view concerning an "acceptable" level of adversely

classified loans may differ, the data do not support the notion that each manager has a target loan quality rating around which this association measure fluctuates over time.

While the trade-off between market share and loan quality is discussed frequently in the literature and is often an issue among managers of financial institutions, the results of this study show no apparent relationship between these two measures of an Association's performance. The data do not support the hypothesis that "aggressive" associations with a large market share experience a higher incidence of adversely classified loans. Nor does loan quality appear to have declined systematically as the Ohio PCA's increased their market share as group over the period studied.

Only one of the major variables was found to be significant with the expected sign in this study (See Table A-6). The variable TOF, a measure of the predominant type of farm in the association area, expressed as the ratio of receipts from livestock and livestock products to total farm receipts in the area, was significant at the 5 percent level in the time period 1969-1977, with both lagged and nonlagged independent variables. The variable CR, representing cash receipts per farm, deflated by the index of prices paid by farmers was significant in the nonlagged form but its coefficient did not have the expected sign.

The significant and positive coefficient for the variable TOF indicates that loan quality was generally lower where the proportion of cash receipts derived from livestock and livestock products was higher. This positive coefficient supported one of the initial interpretations proposed concerning the expected relationship of this variable to loan quality and is consistent with the results of a 1971 study of loan losses in the PCA system conducted by Mire. The total number of losses were highest for cow-calf operations,

while the highest total dollar losses were experienced in feeder cattle operations. In the 4th Farm Credit District, 45.5 percent by number of total losses involved dairy, beef-cow calf, feeder cattle, hog and sheep enterprises. Nearly 20 percent of all losses in the district involved feeder cattle operations--a higher percentage than any other district in the Farm Credit System.

The significance of three association and one year dummy variable indicates the presence of some factors affecting loan quality which were not represented by the major variables. The significance of the association dummy variables indicates a difference for those associations in the level of adversely classified loans from the base association. This difference is due to some factor or factors which are not related to the other independent variables. Differences in the credit management abilities of association personnel may be one of these factors. The significant and positive coefficient for the year dummy variable 1976 again indicates the presence of some factor in 1976 causing loan quality to decline.

Conclusions

Macro-level economic variables (as we defined them) apparently do not explain credit quality (as defined) very well. More association-specific information (such as qualifications of the personnel, attitudes toward quality, work-load, etc.) is required for a better explanation. It also appears that a model with variables lying somewhere between borrower-specific and the macro-level is needed.

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A-1: Ratio of Dollar Volume of Vulnerable plus Loss Loans to Total PCA Dollar Volume Outstanding

Association	Year 1969	1970	1971	1972	1973	1974	1975	1976	1977
A	2.380	1.95	0.245	0.928	1.390	0.645	0.380	2.600	0.076
B	0.459	0.415	0.980	1.10	3.100	0.130	0.516	0.697	0.750
C	0.277	1.100	3.860	2.66	1.820	1.440	2.370	3.340	1.200
D	4.720	2.400	1.480	0.829	0.387	0.314	0.235	0.166	0.077
E	1.980	1.480	2.170	1.15	1.270	0.552	0.952	2.590	2.500
F	2.660	1.910	1.070	0.686	2.230	2.550	2.780	0.000	0.000
G	7.060	2.110	1.490	1.34	2.780	2.430	3.410	3.730	2.480
H	3.880	2.960	1.720	0.380	0.039	0.000	0.086	0.737	0.253
I	1.210	0.297	0.660	0.684	0.205	0.015	0.778	0.492	0.000
J	0.641	2.580	2.580	2.500	1.630	2.320	2.190	4.040	1.330
K	1.680	4.140	4.170	1.950	2.010	1.300	2.790	3.020	2.470

A-2: Means and Standard Deviations of Major Variables, 1969 Through 1977, 11 Ohio PCA Areas

Variable	Association A	B	C	D	E	F	G	H	I	J	K
ALQ (%)	1.18	0.905	2.008	1.183	1.627	1.543	2.981	1.117	0.482	2.201	2.614
	(0.947)	(0.874)	(1.151)	(1.535)	(0.715)	(1.124)	(1.719)	(1.427)	(0.395)	(0.954)	(1.023)
CR	15491	15186	12913	15000	5648	13404	6053	15188	9308	10823	15794
	(1185.0)	(1830.9)	(976.5)	(1298.2)	(511.5)	(1021.4)	(408.7)	(683.8)	(509.3)	(906.1)	(1013.3)
ANFI	6616	5934	6865	6569	6045	5733	5585	6094	6614	6396	5988
	(501.6)	(507.8)	(632.1)	(666.7)	(400.0)	(486.3)	(491.1)	(510.2)	(575.5)	(499.2)	(515.8)
TOF (%)	4.889	9.233	6.822	0.911	8.789	8.977	9.678	8.844	1.433	8.656	7.300
	(4.942)	(6.508)	(4.029)	(7.189)	(3.502)	(7.710)	(5.421)	(9.159)	(6.848)	(3.601)	(4.844)

A-3: Means and Standard Deviations of Major Variables, 1974 Through 1977, 11 Ohio PCA Areas

Variable	Associations										
	A	B	C	D	E	F	G	H	I	J	K
ALQ (%)	0.92	0.52	2.09	0.19	1.65	1.33	3.02	0.27	0.32	2.47	2.39
	(1.14)	(0.28)	(0.97)	(0.10)	(1.05)	(1.54)	(0.66)	(0.33)	(0.38)	(1.14)	(0.76)
CR	16576	16906	13751	16261	5943	14209	6415	15692	9584	11680	16644
	(728.2)	(1039.6)	(627.9)	(464.1)	(565.9)	(994.1)	(309.6)	(500.1)	(486.9)	(378.1)	(911.2)
ANFI	6119	5433	6251	5904	5718	5245	5105	5577	6032	5988	5510
	(254.8)	(240.2)	(309.5)	(322.3)	(384.0)	(230.8)	(274.5)	(213.2)	(226.2)	(500.4)	(345.2)
TOF (%)	20.27	43.10	54.32	43.95-	76.10	31.35	55.05	30.80	45.15	55.82	33.07
	(2.23)	(1.32)	(4.85)	(3.13)	(3.68)	(2.02)	(4.86)	(3.12)	(5.27)	(3.65)	(2.05)
ED	3493	3947	4941	3904	2746	4648	2818	5126	2414	2561	4017
	(365.8)	(454.0)	(284.3)	(293.8)	(198.2)	(540.1)	(102.1)	(575.7)	(259.3)	(93.1)	(692.8)
MS (%)	57.45	44.75	50.95	46.92	76.57	50.95	77.80	70.75	44.98	75.93	37.25
	(2.37	(3.71)	(2.73)	(0.53)	(1.48)	(2.73)	(1.06)	(2.25)	(3.54)	(7.30)	(2.94)
UNEM (%)	6.8	6.72	6.32	6.00-	6.65	6.33	8.93	5.63	7.10	7.00	6.75
	(2.61)	(2.36)	(2.85)	(2.15)	(2.41)	(2.15)	(2.84)	(2.13)	(2.11)	(2.80)	(2.63)

A-4: Correlation Coefficients, 1969 Through 1977

	CR	ANFI	TOF
ALQ	-.20508	-.02117	.17600
CR		.01832	-.74336
ANFI			.20759

A-5: Correlation Coefficients, 1974 Through 1977

	CR	ANFI	TOF	ED	MS	UNEM
ALQ	-.36129	-.20565	.23365	-.19303	.36980	.29342
CR		.16569	-.73028	.61682	-.59107	-.30731
ANFI			.10094	-.07731	-.03379	-.44833
TOF				-.37450	.57967	.02667
ED					-.12290	-.09822
MS						.18903

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A-6: Regression Results for Model I, 1969 through 1977.

Variable	Estimate	T For HO: Parameter = 0	PR > |T|
CR	0.000001 (0.000001)	1.00	0.3185
ANFI	0.00001 (0.000007)	1.46	0.1484
TOF	0.0737 ** (0.0319)	2.31	0.0237
X11("F")	0.0183 * (0.0967)	1.89	0.0623
X12("G")	0.0317 *** (0.0082)	3.89	0.0002
X16("K")	0.0234 ** (0.0110)	2.12	0.0375
X24(1976)	0.0111 ** (0.0046)	2.38	0.0196
Intercept =	-0.1122		
R^2 =	.4809		
F =	3.40 ***		
PR > F =	0.0001		

Standard errors are in parentheses.

* = Significant at the .10 level
** = Significant at the .05 level
*** = Significant at the .01 level

Appendix II

ACCEPTABLE LOANS - Loans of highest quality, ranging down to and including those having significant credit weaknesses.

This classification includes a wide range of loan quality. Member equity in relation to credit extended must be adequate to protect the association from more than normal risk. Management ability and total income must be adequate over a reasonable period of time to assure repayment performance and to maintain or improve the loan quality. These loans will require only normal supervision.

PROBLEM LOANS - Loans having serious credit weaknesses requiring more than normal supervision but believed to be collectible in full.

Weak loans have serious credit deficiencies. Predominant factors in these loans will be questionable integrity, low equity position creating more than normal risk, sub-standard performance, unwise use of credit, adverse trends and faulty management, which individually or collectively result in serious credit weakness. Such loans are believed fully collectible, but require more than normal supervision either to improve performance to acceptable standards or to achieve planned liquidation.

VULNERABLE LOANS - High risk loans still considered collectible, but involving probability of loss in the event repayment from available sources does not materialize.

Very weak loans having critical credit deficiencies. These loans should be collectible provided the association follows prudent loan servicing and exercises diligent collection efforts to obtain repayment planned from normal or other sources of liquidation. However, if the collection from these sources does not materialize, the probability of loss exists. Usually these loans are inadequately secured by primary collateral, and the secondary collateral or other available resources, if any, may represent an uncertain or doubtful source of final liquidation.

LOSS LOANS - Loans on which all or any portion is deemed uncollectible.

These loans represent cases in which it appears that all or a portion of the borrower's total indebtedness to the association, including any previous partial charge-off, will not be collected in full.

Factors Considered in Classifying a Loan

The five fundamentals of sound credit are the basis for consideration in extending credit and are also the bases for loan classification. They are:

1) The Man: Moral responsibility, ability of management, continuity, family cooperation, etc.

2) Financial Position and Progress

3) Repayment Capacity

4) Purpose of Loan and Basis of Approval

5) Collateral Taken or Available as Security

In addition, considerable weight is given to performance on previous or existing loans, and, in the case of new loans, to a borrower's record with other creditors as developed by the association in its credit investigation.

In order to expedite the handling of a large number of loans, an examiner needs to develop proficiency in reviewing loan files. This is best achieved by concentrating on the dividing line between "acceptable" and "problem" loans. A majority of the "acceptable" loans can be recognized quickly by developing a systematic method of checking financial position, loan size, loan purpose, collateral, earnings and performance. It is necessary that an examiner learn to "size up" these factors quickly and where a loan meets the "acceptable" standard, classify it as such and move on. Loss of time occurs most frequently in needless review of details on "acceptable" loans.

Loans other than "acceptable" will require the examiner's careful analysis in order to determine the weakness involved, the loss exposure, if any, and the recommendations to be made. Loans classified as "problem", "vulnerable", and "loss" comprise the core of an association's credit problems, and it is in this area that the examiner's precise evaluation is the most important.

Other Considerations in Loan Classification

Production Conditions and Price Outlook at the Time of Examination--In projecting repayment prospects, due weight is to be given to prevailing crop and pasture conditions in the area as well as current market conditions and prices of the products from which liquidation is expected. The prospective effects of current developments upon the borrower's credit situation at the maturity of his loan need to be considered in classifying the loan. Weaknesses are to be recognized, whether they arise through neglect or other fault of the borrower or come about through forces over which he has no control.

General Economic Status of Farming in the Area -- In analyzing and classifying loans, the examiner needs to take into account not only the credit factors directly related to the individual loans, but also those characteristics of the area which affect the level and dependability of net income. Where production hazards such as serious droughts, frost damage, excessive rainfall, etc., or uncertain markets are recurring problems, their effects upon the year to year repayment capacity of farm and ranch units being financed must be recognized. A proper evaluation of all credit factors is necessary to make the examination report constructive and helpful.

Association Management and Personnel -- Loans are not to be upgraded or downgraded on the basis of the quality of the association's management or other personnel, neither should they be upgraded or downgraded for supervisory purspoes. The effects which an association's actions, or its failure to act, may have had upon the quality of a loan will be reflected in the current condition of the loan, and therefore, in the classification in which it will be placed by the examiner. Recognition of good performance, or criticism for shortcomings of directors, officers and employees will be reflected in the examiner's overall comments and recommendations. These comments and recommendations should direct attention to the risks inherent in a continuation of unsound credit practices and weak loan supervision. Strength or weakness in management may be given recognition also by the character and extent of the examiner's comments and recommendations concerning individual loans.

Adequacy of Recorded Information on Loans -- What constitutes adequate credit information concerning an association's loans will vary with the circumstances surrounding individual cases. An association is expected to assemble and place in its files all pertinent information needed to enable the loan committee to determine the soundness of the loan or advance applied for, together with such information as may be developed subsequently through inspections and other field visits, or other contacts with the borrower or other means. The total of this file information provides the basis upon which the examiner will classify the loan. The examiner will give due recognition to the fact that loans to financially strong operators, with the long record of satisfactory repayment and operating in good agricultural areas, may require less frequent field contacts and progress reports than do loans in which there are significant credit weaknesses.

Loans are classified according to the criteria listed above. Ratios are used only as guidelines. There is no credit scoring system used to develop an index number for each loan. The actual performance of the borrower is the most important consideration in the classification of individual loans. Even if a loan involved apparent security problems, it would likely be classified "acceptable" if there was no history of missed or late payments.